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**6 ft. WADING
INSTRUCTIONS**
for
CROMWELL I, III, IV, V, VI
and
CENTAUR I, III, IV

Chilwell Catalogue No. 62/598.

NH-S 623.138.3
(u)
CROMWELL I:
Box 1
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This book has been produced to the instructions of
THE CHIEF INSPECTOR OF FIGHTING VEHICLES
to whom all communications should be addressed.

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First Edition

March, 1944

FOREWORD

By working to the instructions in this book, the Cromwell or Centaur can be prepared for wading through water up to 6 ft. deep. The method adopted is to make the hull watertight by using certain sealing compounds, and to extend the air inlet and outlet openings above the waterline, by means of "hardware" which can be jettisoned after wading.

On landing, the vehicle can be put into fighting trim without any member of the crew exposing himself.

Wading must be a 100 per cent. successful operation.

The preparation of the vehicle is designed to be carried out by the crew, except for items which require the services of a fitter. In Chapter I the various materials used are described, and all personnel must become familiar with the types and qualities of these materials.

In addition, arrangements must be made for the issue of petrol for cleaning purposes, the loan of stirrup pumps from unit equipment, and the provision of material such as sleepers on which to raise the vehicle while working on the bottom plate.

The vehicle cannot be prepared for wading unless it is "fighting fit" and has been modified in accordance with D.M.E. Circular No. A1514.

Before sealing is commenced, the vehicle should be inspected for incorporation of the requirements of this D.M.E. Circular, which are :—

- (a) One tapped plate welded on the engine compartment roof door.
- (b) An air duct mounting welded to the rear air outlet.
- (c) Two tapping strips welded on turret roof.
- (d) Welding of handle on driver's and co-driver's exits.

Action affecting instruments should also have been taken under D.M.E. Workshop Bulletin No. FC21, dated 19/12/42.

Two requirements are essential for successful completion of the sealing operation.

- (a) **Adequate supervision.**
- (b) **Reasonable working conditions.**

To meet (a) an Officer must be detailed to supervise sealing, and to be responsible for passing all work, as suggested on page 11. A satisfactory arrangement has been found to be the appointment of an N.C.O. to oversee sealing of the troop or squadron leader's vehicle, allowing the troop or squadron leader to undertake general supervision.

To meet (b) a site providing **clean and dry** standings must be selected near to fresh water if possible, in which vehicles can be immersed to 3 ft. Provision must be made for cover over individual vehicles in the event of wet weather, and for the sealing kits to be stored in clean and dry conditions.

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Chapter I Materials and their uses

„ II Stores Required for Sealing

„ III Maintenance Before Sealing Vehicle

„ IV Sealing Instructions, comprising—

Stage 1 Work to be carried out in the field.

„ 2 Work to be carried out immediately prior to embarkation.

„ 3 Work to be carried out after embarkation.

„ 4 Action to be taken immediately on landing.

„ 5 Maintenance to be carried out at the first opportunity after landing.

„ 6 Removal and replacement of special fittings after landing.

Man-hours per Stage

Stage 1	Crew	...	...	...	211 hours
	Fitters	...	...	...	5 hours
„ 2	Crew	...	...	...	10 hours
	Fitters	...	...	...	Nil
„ 3	Crew	...	...	...	2 hours
	Fitters	...	...	...	Nil

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COLOUR GUIDE FOR ILLUSTRATIONS

In the illustrations, the following colours are used to indicate the different sealing materials :—

	RED	— Bostik.
	BROWN (Dark)	— Asbestos Compound.
	GREEN	— Grease or lanolin.
	VIOLET	— Fabric.

Chapter I

Materials and their Uses

(a) CLEANING MATERIALS

CLEANLINESS is the first essential of successful sealing.

Mud, oil, grease and water will each spoil adhesion of the sealing compounds. Whenever work is taking place on sealing during wet weather, efficient cover must be arranged over the vehicle.

For cleaning, the following are used :—

Scraper or Wire Brush : for removing caked mud, loose paint, etc., that water will not shift.

Clean Rag or Cotton Waste : for wiping down after washing, or for use with petrol or Bostik cleaner.

Petrol : for the preliminary cleaning of all oily surfaces. After using petrol, finish off with Bostik cleaner. Petrol must not be used on any of the Bostik compounds, as it will cause them to peel off.

Bostik Cleaner : for finally cleaning surfaces before applying a sealing compound, and for cleaning joints already sealed, when a repair is necessary. Apply sparingly. **Do not use Bostik Cleaner as a thinner for any of the sealing materials.**

REMEMBER : Use **Water** first, then **Petrol**, then **Bostik Cleaner** to finish off.

(b) SEALING MATERIALS

Bostik 692 (Fig. 1)

Is a sealing cement supplied in tubes, each with a detachable nozzle, and operated by winding a key at the bottom of the tube; used on cracks and seams not exceeding $\frac{1}{8}$ inch wide. Apply 692 by holding the nozzle to a seam and turning the key. Smooth the fillet of 692 into the joint using a finger. In cold weather, warm the tube slightly to give an easy flow of compound; if the cement is too stiff, the tube will burst. **Replace the cap on tube after use, and always keep the detachable nozzle clean.** Wash it out with Bostik Cleaner before putting it away.



Fig. 1. Applying Bostik 692.



Fig. 2. Applying Bostik A.A.

Bostik A.A. (Fig. 2)

Is a sealing cement supplied in tins, which are distinguishable by a green band painted round the top. It is used mostly to seal around rivets and bolts and along seams. Though it is usually painted on, it must be smoothed over, using a finger.

To make Bostik A.A. workable, it must be stirred well, and in cold weather the tin must be heated by standing it in hot water. **Always keep the lid on the tin when not in use.**

When sealing bolt or rivet heads, remember it is the joint round the head which needs to be sealed. Bostik painted on top of the head does no good.

W.D. Pressure Plastic

Is a red waterproof putty-like substance with which quite large holes can be filled. Where a large plug of plastic is required, it should be built up by putting on the plastic in layers, and worked out to a "feather" edge. Pressure Plastic is difficult to work, and must be made pliable by kneading. If this does not make it workable enough, it must be heated. The easiest way to do this is to cut up the plastic into workable sized lumps. Place one or two lumps in a tin, and put the tin into a bucket of hot water. **Do not wet the Plastic.**

Pressure Plastic is also used to make a smooth seating for fabric when this has to be stuck across a projection or stop. Before applying the plastic, paint the metal surface with Bostik C, and allow this to dry.

Waterproof Fabric (Fig. 3)

Is a waterproof fabric which must be handled with care and kept clean. It is used for sealing the gun apertures, etc. If one side is shiny, this must face outwards. It is stuck on with Bostik C. **Both fabric and metal must be painted with Bostik C, which must be allowed to get nearly dry before the joint is made;** if the atmosphere is damp this may take as long as half an hour. The fabric is supplied in shaped pieces ready for fitting, but some trimming may be required.

The fabric pieces will be stencilled on the inside to give the position in which they are to be fixed. Before fitting, they must be examined for any holes or thin places. Repair by means of a fabric patch attached with Bostik C.

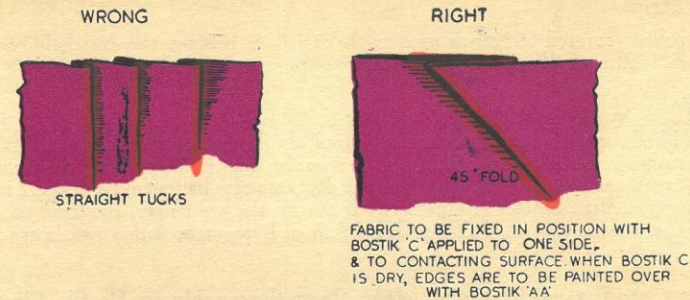


Fig. 3. Taking up slack in waterproof fabric.

Bostik 'C'

Is an adhesive used chiefly to attach fabric to metal, or fabric to fabric. It is painted on both surfaces to be stuck together **as thinly as is consistent with an unbroken film.** It must be kept workable by stirring, and warming if necessary, and the lid must be kept on the tin when possible.

Boscoprene 551

Is a sealing cement used only where there is likely to be oil, because it is oil resistant and will set without coming into contact with the air. It is supplied in two parts; Part A in a tin, and Part B in a bottle.

To use: Shake the bottle well, add the whole quantity to the Boscoprene Part A, and mix well by stirring. **Then use at once.** Putting the lid on the tin will not stop the Boscoprene setting hard.

Asbestos Compound (See Fig. 4)

Is a high melting point sealing compound used for sealing cracks, and the seams. It is tenacious but easily worked. It must be applied liberally but not too thickly, with all edges "feathered" off and with **the top smoothed over to present an unbroken surface.** In this book the compound is referred to as A.C.

Lanolin

Is a yellow coloured grease used for sealing a few special parts, such as periscopes.

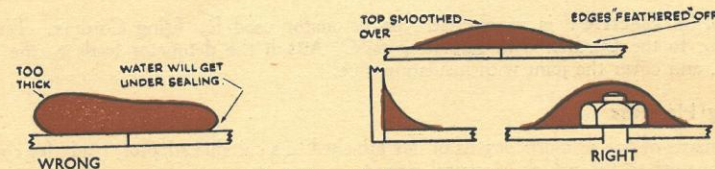


Fig. 4. Sealing with asbestos compound.

Sealing Strips

Are rubber covered felt strips used to make a joint between the detachable and fixed "hardware" fittings. These strips are stuck to the metal with Bostik C.

Brushes

Two 1 in. brushes and one 2 in. brush are supplied with the kits of sealing materials. Before use, all brushes must first be soaked, so as to stop the bristles falling out; then check that the 1 in. brush has bristles 1 in. long (i.e., the diameter of a halfpenny) and the 2 in. brush 1½ in. long (i.e., the diameter of a penny). If the bristles are longer, cut them off to these lengths. Cut bristles square. Paint on Bostik A.A. or Boscoprene with a 1 in. brush; Bostik C with a 2 in. brush.

Before storing used brushes, clean them thoroughly in Bostik Cleaner or they immediately become useless.

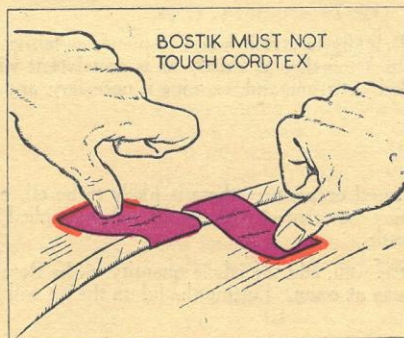


Fig. 5. Fixing Cordtex.

(c) CORDTEX AND FITTINGS

Cordtex (Fig. 5)

Is an explosive in the form of a flexible cord that is used for blowing off the fabric covers. Bostik compound will damage Cordtex so that it will not explode when required. **Do not allow Bostik to touch the Cordtex.**

Detonator

No. 33 Electric : is an electric type detonator used for firing Cordtex. Bind the detonator to the Cordtex with insulating tape. Attach the detonator leads to the wiring harness, and cover the joint with insulating tape.

Wiring Harness

Consists of one or more lengths of flex attached to a suitable adaptor, ready for coupling the detonators to the vehicle electrical circuit.

SUPERVISION OF SEALING

Experience has shown that it is vital for sealing to be supervised by a responsible officer. He must undertake to plan the operation, and to inspect all work in detail and pass it as satisfactory, or delegate such inspection to another officer or N.C.O.

The sealing instructions are grouped where possible under the material specified. So far as practicable, seal in the sequence set out.

The officer supervising should inspect for :—

CLEANING before putting on the sealing compounds.

WASTE of materials through painting Bostik alongside of, instead of in the joints, leaving the lids off tins, failure to clean brushes, and applying A.C. too thickly.

EFFICIENCY of all sealing. Bostik must be applied in an unbroken film. Check that this is so in all awkward corners. Pressure Plastic and A.C. must be firmly pressed down at the edges. Fabric must be folded neatly, with no gaps in sticking down the edges.

COMPLETION of all items in these instructions, and that work has been done according to the instructions.

REMEMBER :

Clean the vehicle, then move it to a fresh site. You can't seal while standing in a pool of mud. Cover must be arranged over the vehicle in wet weather.

Chapter II

Stores Required For Sealing

Index to Special Kits

Kit		
A	Hardware stores which crews will need during Stages 1 and 2 of the Sealing Instructions.	1 per vehicle
C	Software stores which crews will need during Stage 1 of the Sealing Instructions.	1 per vehicle
D	Software stores which crews will need during Stages 2 and 3 of the Sealing Instructions.	1 per vehicle
E	Explosive stores which crews will need during Stages 1 and 2 of the Sealing Instructions.	1 per vehicle

NOTE.—Further supplies of all materials listed can be obtained on application to the Commandant, Chilwell. Indents should be forwarded with a covering letter, for the attention of O i/c P.2.1. (Wading).

IMPORTANT

1. Kit 'D' will be supplied in a box marked "Not to be opened until just prior to embarkation," and this box will be included in Kit 'C.' It is imperative that this instruction be adhered to, otherwise units will find they are short of stores to carry out the work required by Part 2 and 3 of the Sealing Instructions. If after completing the work required by Part 1 of the Sealing Instructions, any of Kit 'C' remains unused, this should be taken to the point of embarkation for use as spares.
2. On the following pages all items in the kits are listed. This is done to enable the kits to be checked on receipt by units. In the event of a kit being found incomplete the fact should be reported.

**List of Kits required
for
6 ft. Wading,
Cromwell I, III, IV, V, VI
and
Centaur I, III, IV.**

KIT 'A'

Drg. No.	Vocab. Section	Part No.	Designation	No. off	Remarks
EC. 226	LVI/LD	EC. 226	Air outlet duct ...	1	
EC. 243	LVI/LD	EC. 243	Blanking plate and tee bolt (small) ...	2	
EC. 244	LVI/LD	EC. 244	Blanking plate and tee bolt (large) ...	4	
EC. 246	LVI/LD	EC. 246	Special blanking plate L.H. ...	1	
EC. 247	LVI/LD	EC. 247	Special blanking plate R.H. ...	1	
EC. 355	LVI/LD	EC. 355	Struts for loader's door ...	1	
EC. 356	LVI/LD	EC. 356	Clip bracket. ...	1	
EC. 357	LVI/LD	EC. 357	Air intake funnel ...	1	
EC. 358	LVI/LD	EC. 358	Cover plate L.H. ...	1	
EC. 359	LVI/LD	EC. 359	Cover plate R.H. ...	1	
EC. 360	LVI/LD	EC. 360	Bolt for cover ...	4	
EC. 361	LVI/LD	EC. 361	Intermediate cover plate ...	2	
EC. 362	LVI/LD	EC. 362	Front cover plate ...	2	
EC. 363	LVI/LD	EC. 363	Rear vee tie rod ...	1	
EC. 371	LVI/LD	EC. 371	Release gear ...	1	
TP. 18582	LVI/VH	T.P. 18582	Air duct tee bolt ...	4	For EC. 226
	LV6/MT5	15844	Plain nut $\frac{1}{2}$ B.S.F. ...	10	
	LV6/MT5	49948	Spring washer $\frac{1}{8}$ in. dia. ...	4	For EC. 355-356
	LV6/MT5	49949	Spring washer $\frac{3}{8}$ in. dia. ...	2	For EC. 371
	LV6/MT5	9731	Plain washer $\frac{1}{2}$ in. dia. ...	2	For EC. 226
	LV6/MT5/FB/105/4D		Bolt $\frac{1}{8}$ in. B.S.F. $\frac{1}{2}$ in. long ...	4	For EC. 355-356
	LV6/MT5/FB/105/4D		Bolt $\frac{3}{8}$ in. B.S.F. $\frac{1}{2}$ in. long ...	2	For EC. 371
EC. 348			Crew instructional drawing ...	1	

KIT 'C'
NIV 476

Drg. No.	Vocab. Section	Part No.	Designation	No. off	Remarks
EC. 230	LVI/LD	EC. 230	Relt sealing strip (short) ...	2	
EC. 232	LVI/LD	EC. 232	Relt sealing strip (long) ...	2	
EC. 290	LV6/MT 15	NIV 794	Fabric for turret guns ...	1	
EC. 291	LV6/MT 15	NIV 795	Fabric for gun muzzle ...	1	
EC. 307	LV6/MT 15	NIV 796	Fabric for auxiliary guns ...	1	
EC. 331	LV6/MT 15	NIV 797	Fabric for fans ...	2	
EC. 332	LV6/MT 15	NIV 798	Fabric for auxiliary gunner periscope sight ...	1	
EC. 333	LV6/MT 15	NIV 799	Fabric for mushroom air intake (long) ...	2	
EC. 334	LV6/MT 15	NIV 800	Fabric for mushroom air intake (short) ...	2	
EC. 335	LV6/MT 15	NIV 801	Fabric for stowage bins (long) ...	12	
EC. 336	LV6/MT 15	NIV 802	Fabric for stowage bins (short) ...	6	
EC. 337	LV6/MT 15	NIV 803	Fabric for rear light ...	1	
EC. 338	LV6/MT 15	NIV 804	Fabric for rear air outlet ...	1	
EC. 345	LV6/MT 15	NIV 805	Wiring harness (turret) with bayonet ...	1	
EC. 346	LV6/MT 15	NIV 806	Wiring harness (driver's compartment) with plug ...	1	
	LV6/MT 15	NIV 192	Bostik C. ...	2	1 quart tins
	LV6/MT 15	NIV 191	Bostik A.A. ...	6	1 quart tins
	LV6/MT 15	NIV 193	Bostik cleaner ...	4	1 quart tins
	LV6/MT 15	NIV 194	Bostik 692 ...	10	tubes
	LV6/MT 15	NIV 438	Asbestos compound ...	126 lb.	9x14 lb. container
	LV6/MT 15	NIV 195	Boscoprene A ...	2	tins
	LV6/MT 15	NIV 196	Boscoprene B ...	2	bottles
	LV6/MT 15	NIV 201	Grease G.S. ...	1	7 lb. tin
	LV6/MT 15	NIV 206	Brush paint 2 in. ...	1	
	LV6/MT 15	NIV 207	Brush paint 1 in. ...	2	
	LV6/MT 15	NIV 208	Brush, wire ...	1	
	LV6/MT 15	NIV 215	Chalk ...	1	stick
	LV6/MT 15	NIV 205	Tape, insulating, $\frac{1}{2}$ in., 2 ozs. ...	3	rolls
	LV6/MT 15	NIV 210	Knife, putty ...	2	
	LV6/MT 15	NIV 211	Scraper ...	2	
	LV6/MT 15	NIV 203	Lanolin ...	1	1 lb. tin
	LV6/MT 15	NIV 200	W.D. pressure plastic ...	9 lb.	1x7 lb. container 1x2 lb. container

KIT 'D'

LV6/MT 15	NIV 812	Tape, masking, 4 in. wide ...	100 ft.	
LV6/MT 15	NIV 192	Bostik C. ...	1	quart tin
LV6/MT 15	NIV 191	Bostik A.A. ...	1	quart tin
LV6/MT 15	NIV 438	Asbestos compound ...	3	7 lb. and 2 2 lb. tins
LV6/MT 15	NIV 201	Grease, G.S. ...	7	lb. tin
LV6/MT 15	NIV 206	Brush, paint, 2 in. ...	1	
LV6/MT 15	NIV 205	Tape, insulating, $\frac{1}{2}$ in., 2 ozs. ...	1	
LV6/MT 15	NIV 200	W.D. Pressure plastic ...	2	7 lb. tins

KIT 'E'

EC. 339		Cordtex with end caps (for fan) ...	2	
EC. 340		Cordtex with end caps (for periscope sight) ...	1	
EC. 341		Cordtex with end caps (for auxiliary gun) ...	1	
EC. 342		Cordtex with end caps (for mushroom air intake) ...	1	
EC. 343		Cordtex with end caps (for side blanking plates) ...	2	
EC. 344		Cordtex with end caps (for main armament) ...	1	
TP. 18805		Detonator electric No. 33 ...	9	

Chapter III

Maintenance Before Sealing

Check stores of sealing materials and special fittings to the list provided with the kits. Paint the vehicle number on hardware items.

Remove from the vehicle all externally stowed items which would be damaged by immersion in salt water. Arrange to re-stow internally as convenient, or to hand to unit transport.

Clean the Vehicle

Remove the worst of any mud and dirt by use of the scraper and wire brush.

Wash down with water, using a stirrup pump, which should be available on loan from unit equipment. The jet will clean out awkward corners.

Remove any dirt remaining with the scraper or wire brush, and then let the vehicle dry.

Wash down the "hardware."

Clean off with petrol any other oil or grease remaining on the vehicle.

Move the vehicle to a **clean** site. If possible, mount it on sleepers, or run it over a pit to facilitate access to the hull bottom plates.

Make sure that, in the event of wet weather, cover can be erected without moving the vehicle.

**You must clean before you seal,
Otherwise the stuff will peel**

Carry out the full provisions of the Crew Maintenance Schedule, including lubrication of every point specified on the Lubrication Chart, irrespective of time period.

Fill up with petrol, oil and water.

Clean off any oil or grease which may have been spilled during the above operations.

Remove rear smoke generators and bind over the ends of the electric leads with insulating tape.

Remove the rear towing hook.

Remove the nose and tail sections of both left-hand and right-hand track guards.

Check the fit of exterior stowage locker lids and readjust if necessary.

Close the fording flap. First release the four levers in the bottom outlet louver, then push the flap fully forward and lock it closed with the four levers.

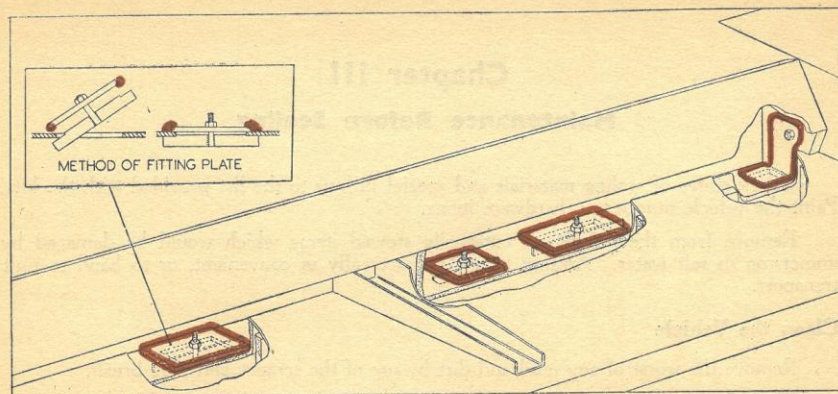


Fig. 6. Fitting blanking plates over apertures above suspension.

Fit the blanking plates in position over the apertures in the suspension compartment top channel, (see Fig. 6.)

First place a bead of A.C. around the edge of each aperture, then insert the blanking plate and bolt it firmly in position. Finish by building up A.C. completely around the edge.

Re-position the side fuel tank vents proceeding as follows (**this must be done by a fitter**) :—

Rotate the turret so as to gain access to the air filter access doors. Open doors and uncouple both fuel tank vent pipes from the union on the hull inner side plates. Bend pipes carefully to bring them upwards clear of roof plate and inside.

Tap a wooden plug into the unions left open by uncoupling the vent pipes, and cover completely with A.C.

Assemble "hardware" release gear (see Figs. 7, 8, 9) and bolt in position on the adaptor plate welded to the engine compartment roof door. Attach the operating handle to the outside retaining catch of the loader's hatch, wiring it in place.

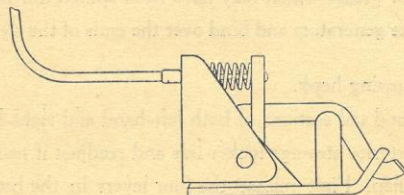


Fig. 7. Hardware release gear unit.

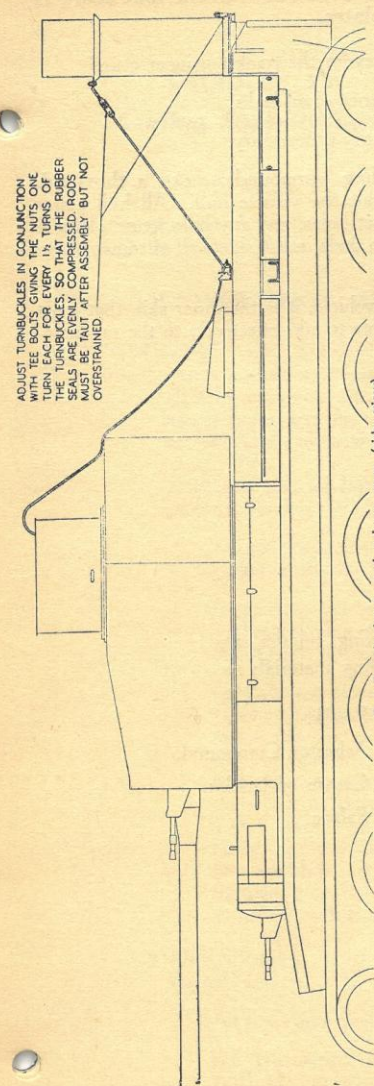


Fig. 8. Hardware and release gear (side view).

CHECK RELEASE GEAR FOR EASE OF WORKING BEFORE ASSEMBLING TIE ROD.

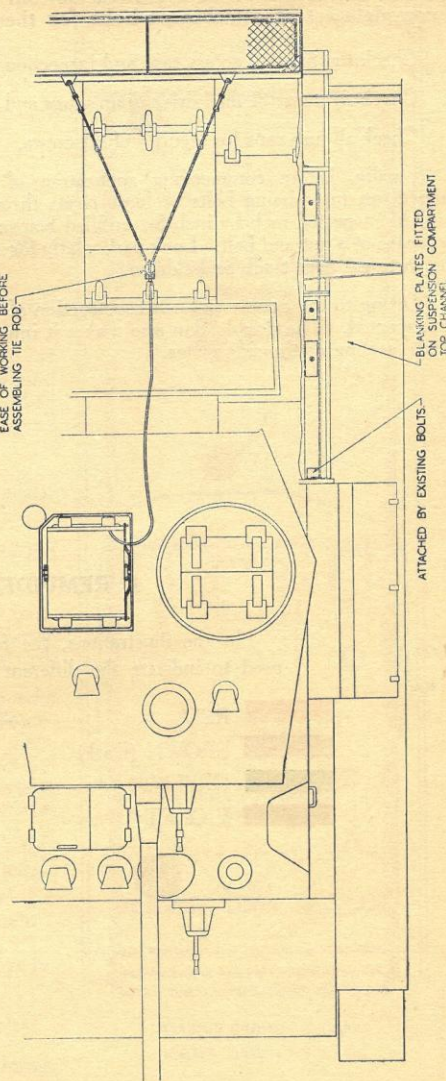


Fig. 9. Hardware and release gear (plan view).

BLANKING PLATES FITTED ON SUSPENSION COMPARTMENT TOP CHANNEL

ATTACHED BY EXISTING BOLTS

Remove all access plates from the bottom of the vehicle. Check that there is a complete set of attachment bolts for these plates.

Check tightness of access caps and inspection plates for the track tensioner gear.

Check tightness of final drive drain plugs and absence of oil leaks.

Check all hub caps for security of setscrews. Rectify if necessary.

Finally, before commencing application of sealing compounds, make a **thorough inspection** for missing bolts or loose rivets throughout the vehicle hull. All hull plates must be inspected inch by inch for unfilled bolt or rivet holes, and any hole found plugged by means of a nut and bolt. Look particularly for $\frac{1}{8}$ in. hole in left side wall of transmission compartment over track brake drum.

Owing to the double skinned construction of the vehicle, it is the inner skin that must be inspected. The double skin also makes it impossible to add effectively to the manufacturers' sealing of the side plates.

A REMINDER—

In the illustrations, the following colours are used to indicate the different sealing materials :—

RED	—	Bostik.
BROWN (Dark)	—	Asbestos Compound.
GREEN	—	Grease or lanolin.
VIOLET	—	Fabric.

Chapter IV Sealing Instructions

STAGE I

(After completion of this Stage, the vehicle must not be driven more than 75 miles)

SEALING LOWER PARTS OF HULL

BOTTOM (Fig. 10) Clean with Bostik cleaner all seams on the bottom plate, around all bolts and rivets, and around all access holes and the faces of all access plates and gaskets.

Refit and seal all bottom access plates as follows :—

Set out the access plates and gaskets ready for fitting.

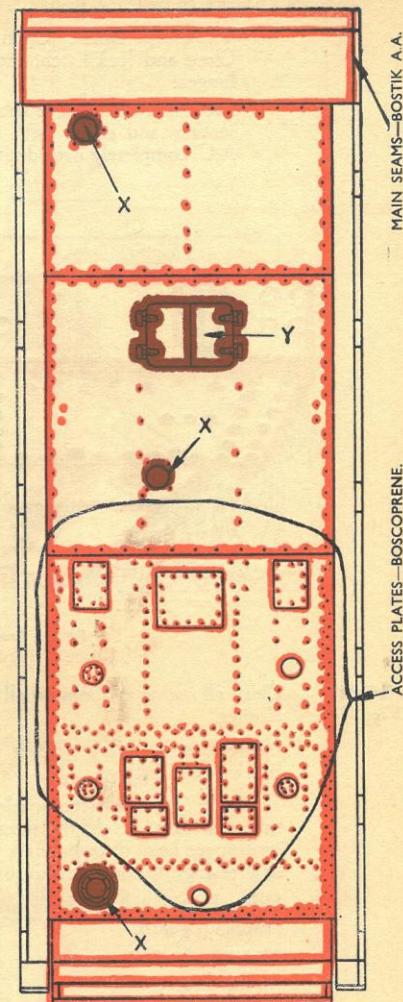
Prepare Boscoprene by mixing the contents of the bottle into the tin, and stirring well.

Immediately coat both sides of each gasket with Boscoprene, place on access plate, and put plate in position and bolt up securely, dipping each bolt in Boscoprene as it is replaced. If plates fit badly, apply a fillet of P.P. between plate and hull before tightening up bolts and coat as before with Boscoprene.

Using Bostik A.A. or 692 as required, seal :—

All bolts and rivets.

All transverse and longitudinal seams and around all access plates.



SLUDGE DRAINS "X"—A.C.
ESCAPE HATCH "Y"—A.C.

Fig. 10. Hull bottom plate sealing.

Using A.C. seal as follows :—

The escape hatch. Open hatch, lay bead of A.C. on all mating faces. Close and lock hatch, then fill all seams with A.C. completely covering hinges.

Front and rear sludge drains, and centre drain. Open each drain, clean seating and smear with A.C. Close drain and secure, then build up A.C. completely over drain.

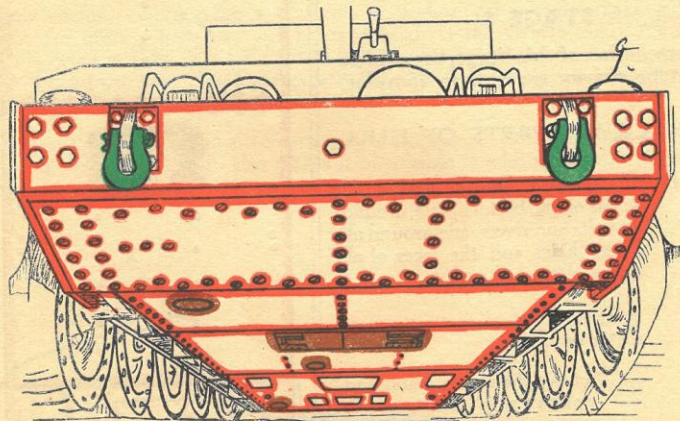


Fig. 11. Front plates of hull.

FRONT (Fig. 11)

Clean all seams and around all bolts and rivets, using cotton waste and Bostik cleaner.

Using Bostik A.A. or 692 as required, seal all seams including around all brackets and fittings.

To apply 692, screw the nozzle on the tube, fit the key on the flat end of the tube and turn. Hold the nozzle to the seam, moving the tube so as to lay a continuous bead of compound. Finish off by drawing a finger along the seam, so pressing the compound into the seam (see Fig. 1).

Using Bostik A.A. seal all bolts and rivets, and around the fixings for each headlamp guard.

With grease G.S. smear over each shackle and in the towing and lifting eye shackle holes.

Smear A.C. along the seam of each access plug to the track tensioner inner worm gear (Centaur type).

Completely bed each tensioner axle housing in A.C., including covering all attachment bolts, access caps, and inspection plates on the housing (see Fig. 12 showing Centaur and Cromwell types of axle).

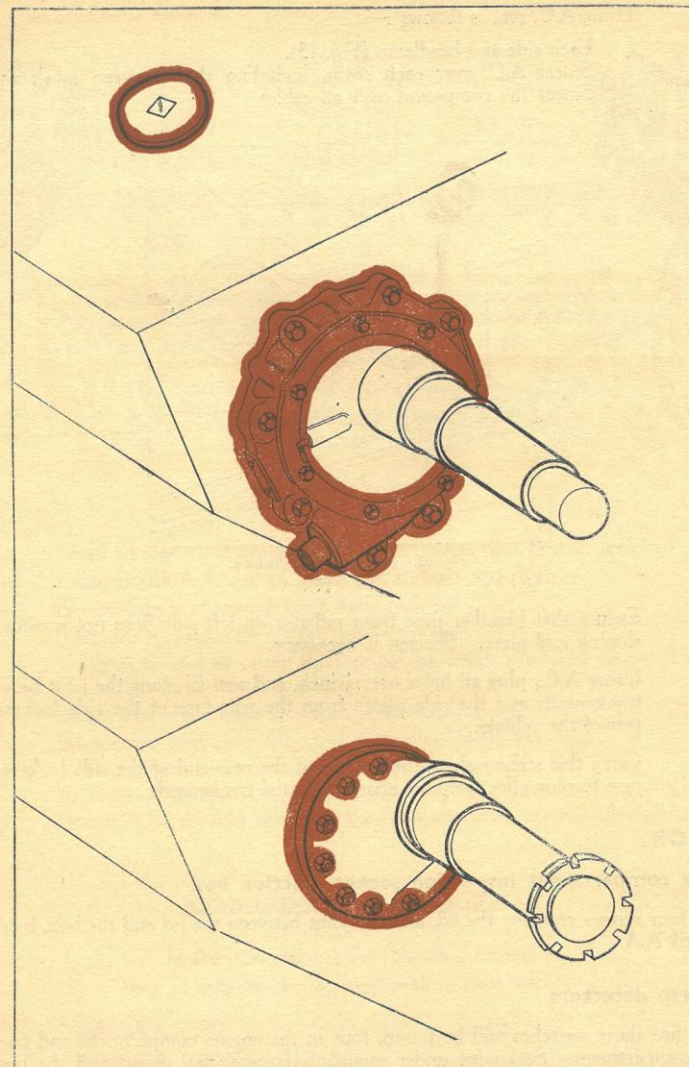


Fig. 12. Eccentric-axle housings (track-tensioners).
Showing Centaur type (top) and Cromwell type (bottom).

Using A.C. seal as follows :—

Each side and headlamp (Fig. 13).

Smear A.C. over each seam, including that between mask and glass.
Smear the compound over all cables.

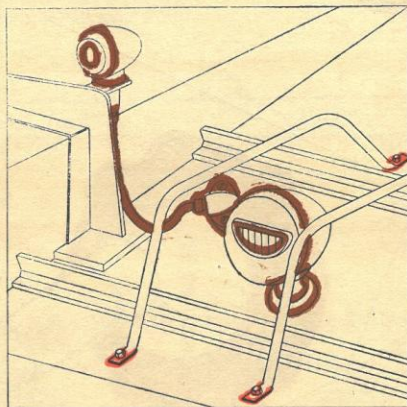


Fig. 13. Headlamp and sidelamp.

SIDES

Ensure that breather pipe from radiator on left side does not project beyond sloping roof plate. Shorten if necessary.

Using A.C., plug all holes over $\frac{1}{8}$ inch, and seal all along the joint between the trackguards and the side plates from the rear face of the side lockers to the rear of the vehicle.

Carry this sealing along the bottom of the rear end of the side lockers, taking care to plug effectively the channels in the trackguards.

INTERIOR

Gearbox compartment inspection socket junction box

Seal four screws securing the lid, and the joint between the lid and the box, by painting with Bostik A.A.

Fire alarm detectors

Five fire alarm switches will be found, four in the engine compartment and one in the gearbox compartment. Seal joint under moulded terminal box cover, and the two cover fixing screws by painting with Bostik A.A. Push W.D.P.P. into the two cable entries and bury the cable ends themselves in a lump of the plastic for a distance of about 1 inch from the actual terminal block, making sure the ends of the W.D. Pressure Plastic are feathered off.

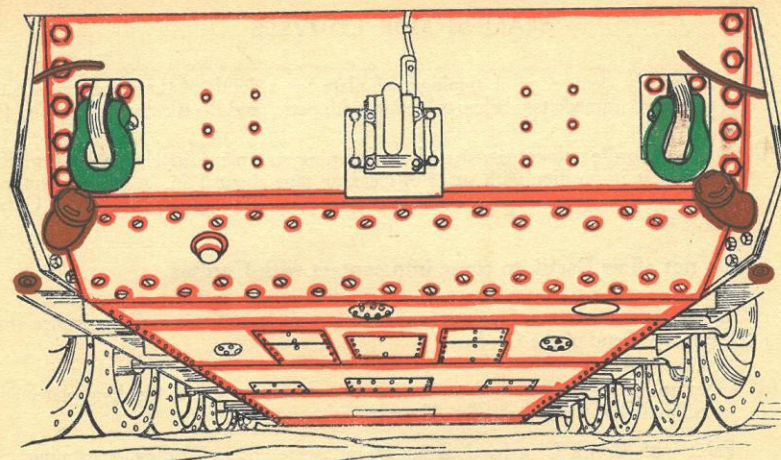


Fig. 14. Rear hull plates.

REAR (Fig. 14)

Clean all seams and around all bolts and rivets with Bostik cleaner.

Using Bostik A.A. seal all seams and all bolts and rivets.

Smear threads of towing hook studs with A.C.

Coat electric cables for smoke generators with A.C.

Using A.C. seal all round the fording flap inside the lower air outlet aperture, including over the retaining levers.

Smear over the towing eyes with grease G.S.

Smear over final drive filler and drain plugs with A.C.

If an auxiliary tank coupling is fitted, cover this with A.C.

Paint joint between detachable dome cover and body of convoy lamps with Bostik A.A., making sure that the light apertures are not obscured.

REMEMBER THE COLOURS—

In the illustrations, the following colours are used to indicate the different sealing materials:—

RED	— Bostik.
BROWN (Dark)	— Asbestos Compound.
GREEN	— Grease or lanolin.
VIOLET	— Fabric.

SEALING SIDE LOUVRES

- Thoroughly clean edge of sloping roof plate for a depth of three inches, and the track guard immediately below this edge, with petrol and Bostik cleaner (see Fig. 15).
- Position Cordtex along extreme edge of sloping roof plate, as shown in Fig. 15A, securing it in position with strips of masking tape about 1 in. $\times$ 3 ins., wrapped round the Cordtex, and the ends fastened to sloping roof plate with Bostik C. (see Fig. 15A).

Do not allow Bostik to come into contact with Cordtex.

- Connect detonators to Cordtex by binding with insulating tape, six inches from the forward end of the Cordtex.
- Offer up blanking plates and ensure fit. Clean outside face of blanking plates with petrol and Bostik cleaner (Figs. 15B and 15C).

Paint with Bostik C. a band about $2\frac{1}{2}$ ins. wide above Cordtex on sloping roof plate, and along track guard below.

When dry, coat with Bostik C. along top and bottom edges of blanking plates a band about $2\frac{1}{2}$ ins. wide.

Cut masking tape to exact length of plates. Coat edges of tape on one side with Bostik C., leaving untreated about an inch in the centre where it comes into contact with the Cordtex, and allow to become nearly dry.

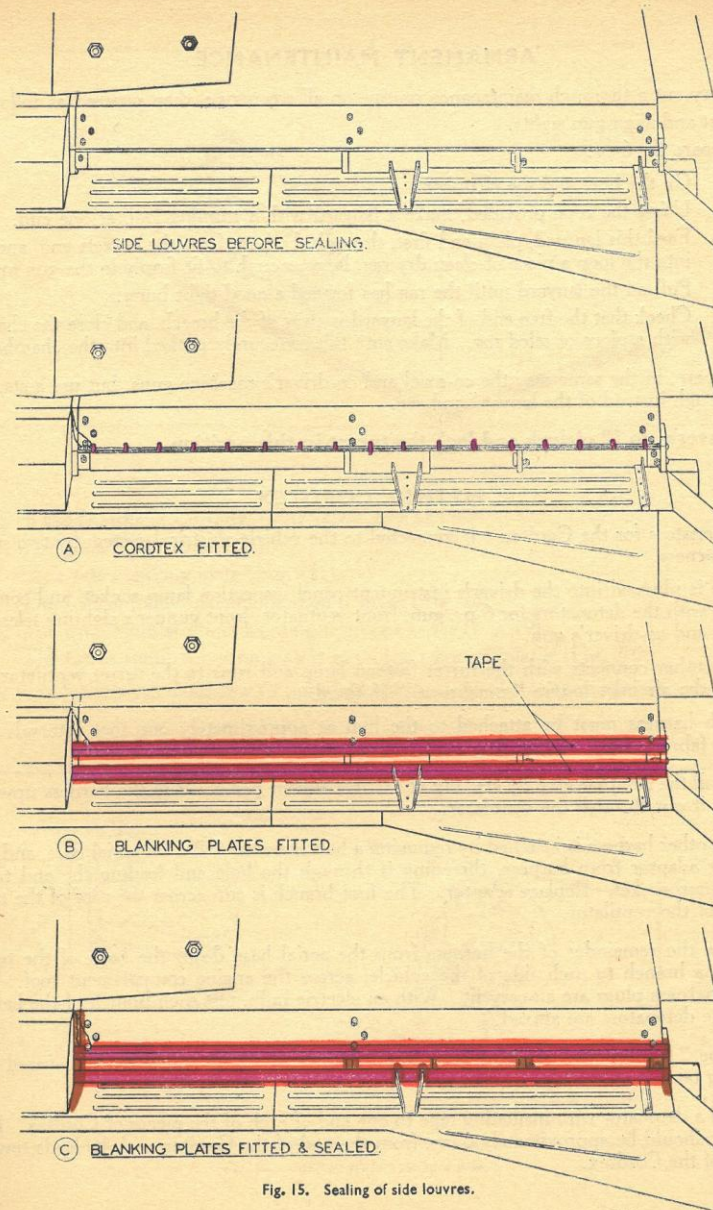
Fix masking tape along upper and lower edges of plates so as to leave half the tape width projecting over the edge.

Position blanking plates, and secure by pressing tape firmly (over Cordtex at the top) on the prepared surfaces of the sloping roof plate and track guard.

The rear, semi-permanent plate must be placed so as to allow thumb screws to pass through into the tapped pads already positioned.

Tighten thumb screws.

Before running engine, after fitting blanking plates, remove the two inspection doors in the engine room forward bulkhead to allow circulation of air.



ARMAMENT MAINTENANCE

Carry out a thorough maintenance routine on all weapons ; then proceed as follows:—
Test and align gun sights.

Prepare the 6-pr.

- (i) Oil the bore and the chamber.
- (ii) Using the rope provided, make a lanyard with a running loop at one end.
- (iii) Feed this lanyard, plain end first, through the bore from the muzzle end, and pass into the loop a piece of clean dry rag, large enough to fit firmly in the gun muzzle.
- (iv) Pull on the lanyard until the rag has formed a good tight bung.
- (v) Check that the free end of the lanyard is clear of the breech, and close the chamber with a piece of oiled rag. Make sure this is securely packed into the chamber.

Prepare, in the same way the co-axial and co-driver's machine guns, but use a standard pull-through instead of the lanyard and rag.

Traverse to 12 o'clock and lock the turret in this position.

FITTING CORDTEX

Detonators for the Cordtex are connected to the vehicle electrical system by two sets of wiring harness.

One is plugged into the driver's instrument panel inspection lamp socket, and connects with the detonators for 6-pr. gun, front ventilator, front gunner's sighting telescope, and co-driver's gun.

The other connects with the turret festoon lamp and runs to the turret ventilator, and the air inlet louvre "mushroom," if fitted.

Each harness must be attached to the hull at approximately one foot intervals by a fabric "tab" as Fig. 5.

Install the front harness by starting at the instrument panel. Run the harness upwards, and pass it out through the ventilator.

The other harness is installed by removing a bolt from the "B" set aerial base, and after removing adaptor from harness, threading it through the hole and leading the end to the festoon lamp socket. Replace adaptor. The first branch is run across the roof of the turret and out of the ventilator.

Take the remainder of the harness from the aerial base down the back of the turret, then run a branch to each side of the vehicle, across the engine compartment roof. Test that the harness plugs are an easy fit. With an electric bulb, test each branch of the harness before the detonators are affixed.

If the "mushroom" air inlet branch is not to be used, its end must be covered with insulating tape.

Bind a detonator with insulating tape to one end of each of the pieces of Cordtex. Each detonator should be approximately 6 ins. from the end of the Cordtex with its leads towards the end of the Cordtex.

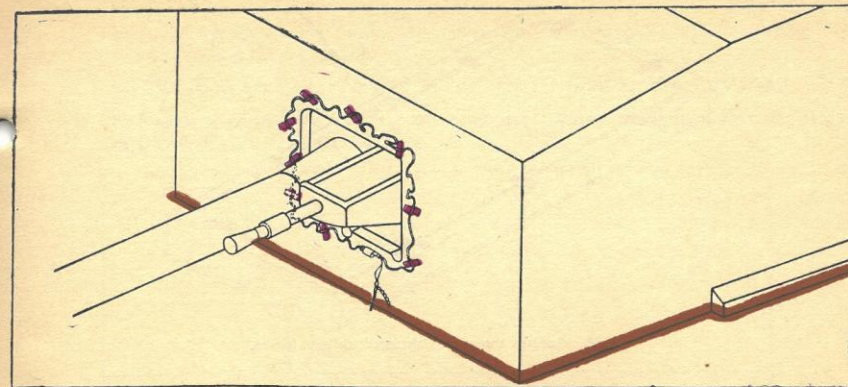


Fig. 16. Cordtex around turret guns.

Attach the lengths of Cordtex, using fabric tabs to :—

The guns (Figs. 16 and 17).

Each side blanking plate (Fig. 15A).

The "mushroom" air inlet louvre if fitted (Fig. 18).

The front ventilator and sighting telescope cover (Fig. 19).

The turret ventilator, arranging it as on the front ventilator (Fig. 20).

Securely fasten each detonator to the wiring harness, insulating the joint with insulating tape.

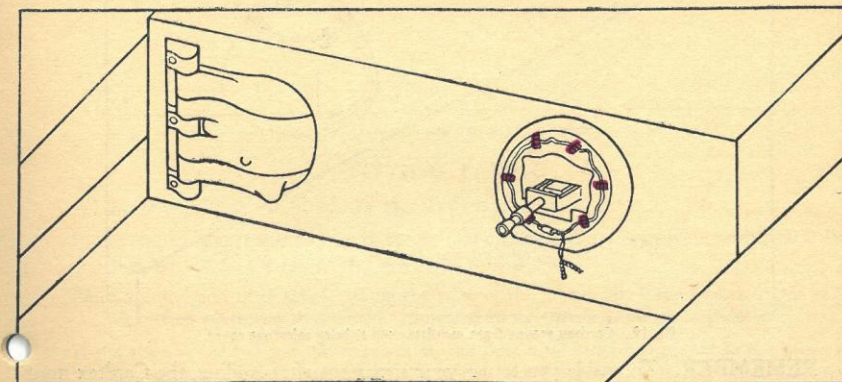


Fig. 17. Cordtex around forward Besa.

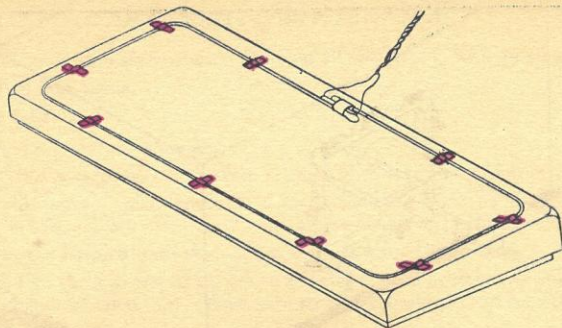


Fig. 18. Cordtex around "mushroom" air inlet louvre.

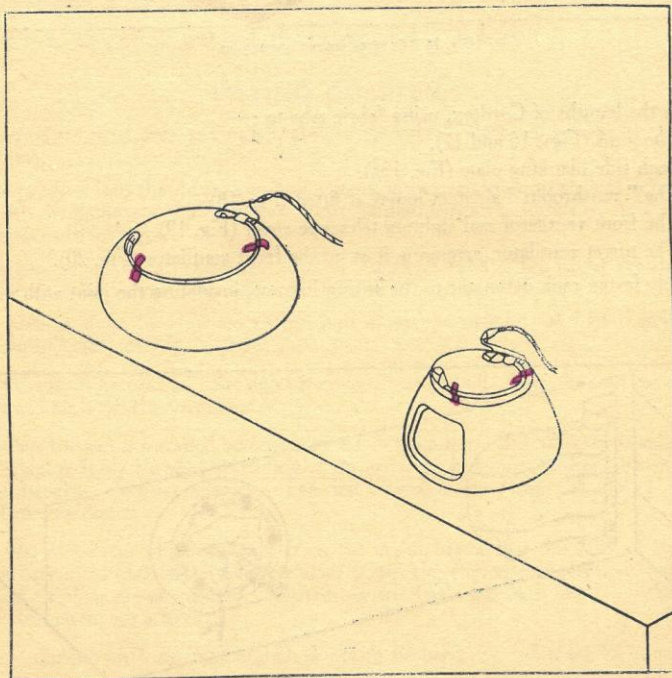


Fig. 19. Cordtex around front ventilator and sighting telescope cover.

REMEMBER. To enable you to use your armament after landing, the Cordtex must detonate. This depends on the following :—

1. Sound connections to the wiring harness of the detonator leads. Twist the wires securely together, and bind each connection individually with insulating tape, before binding the whole joint.
2. No Bostik on Cordtex, as Bostik will prevent the Cordtex from exploding.
3. Sufficient slack in Cordtex and wiring harness to allow for slight movement of guns or turret due to ineffective locking.

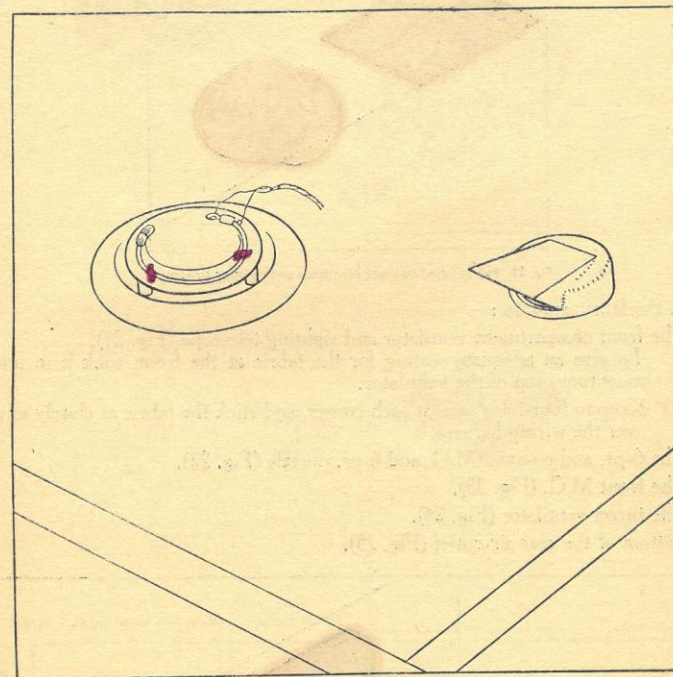


Fig. 20. Cordtex fitted to turret ventilator.

FITTING FABRIC

All fabric seals must be fitted in a **similar** manner.

First offer up the fabric and mark its outline on the hull. Clean for a width of at least 3-4 ins. inside the marking, then paint with Bostik C.

Paint a 2 in. band of Bostik C. along the edge of the fabric, allow the Bostik to get nearly dry, then place the fabric in position and firmly press its edges in place.

If the seals are of balloon fabric material, the Bostik C. must be applied to the dull side, i.e., undoped side. Any folding required to get a good fit must be done as neatly as possible, with the fabric stuck as flatly as possible down the depth of the fold.

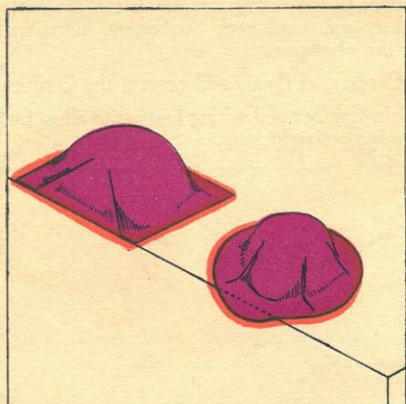


Fig. 21. Fabric fitted to front ventilator and sighting telescope.

Attach the fabric seals to :—

The front compartment ventilator and sighting telescope (Fig. 21).

To give an adequate seating for the fabric at the front, tuck it in under the mushroom top of the ventilator.

Keep to four folds, one at each corner, and stick the fabric as closely as possible over the wiring harness.

The 6-pr. and co-axial M.G. and 6-pr. muzzle (Fig. 22).

The front M.G. (Fig. 23).

The turret ventilator (Fig. 24).

Bottom of the rear air outlet (Fig. 25).

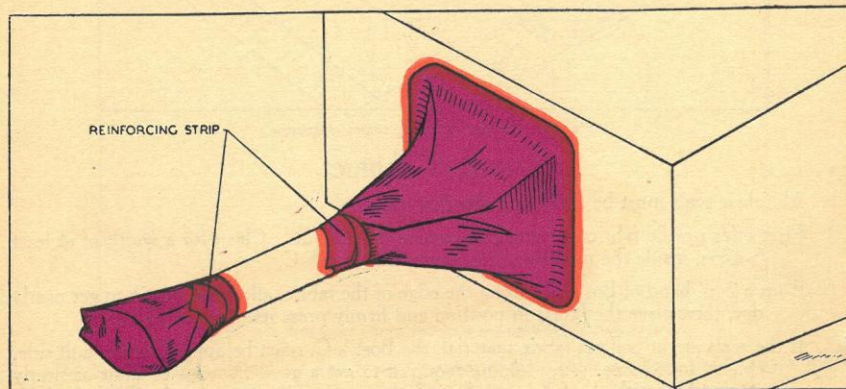


Fig. 22. Fabric fitted to turret guns.

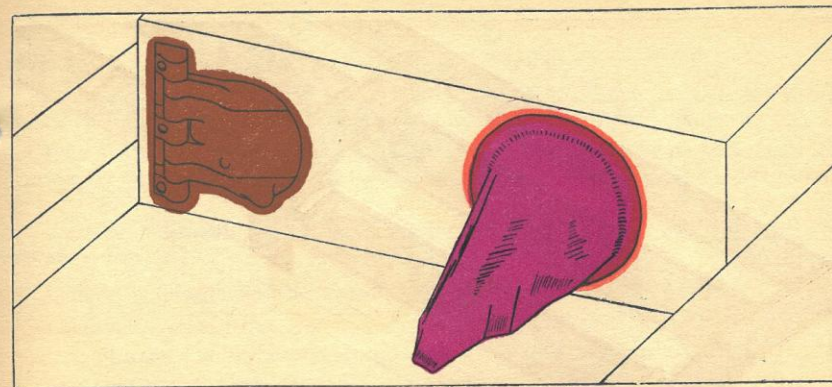


Fig. 23. Fabric fitted to forward Besa.

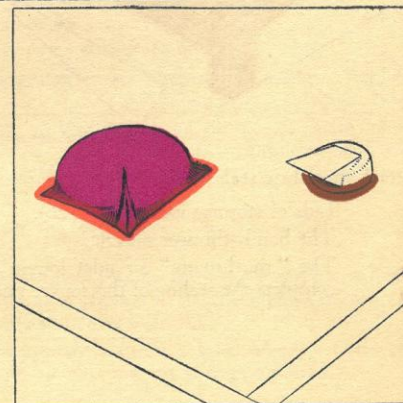
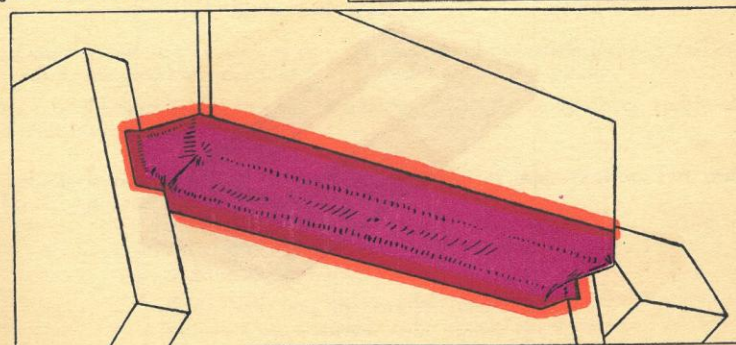


Fig. 24.
Fabric fitted
to turret
ventilator

Fig. 25. Fabric fitted to bottom of rear air outlet.



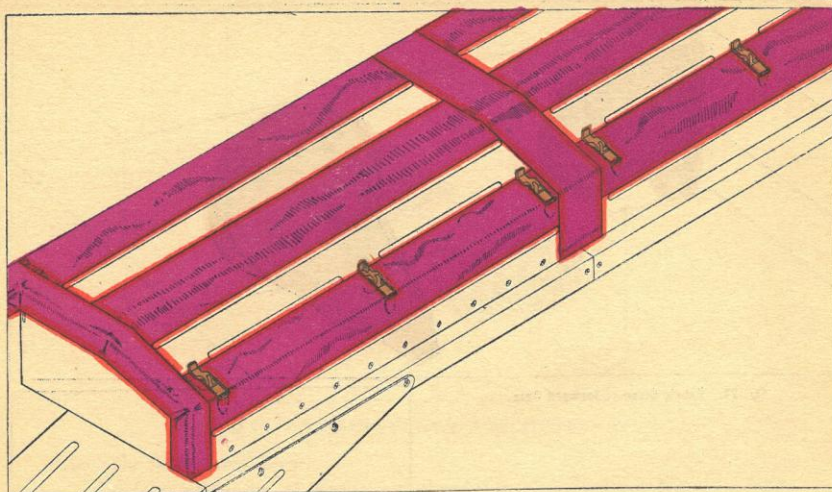


Fig. 26. Lids of stowage lockers sealed with fabric.

Attach the fabric seals to :

Lids of stowage lockers (Fig. 26).

The bomb-thrower muzzle.

The "mushroom" air inlet louvre if fitted (Fig. 27). It will not be possible to complete the sealing of this louvre until the petrol tanks have been finally re-fuelled.

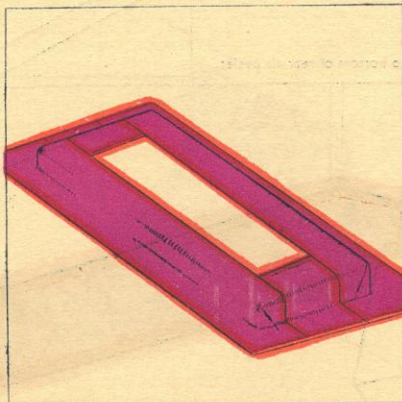


Fig. 27. "Mushroom" air inlet louvre sealed with fabric.

COMPLETION OF STAGE I SEALING

Attach the sealing strips on the seatings for outlet air duct.

Paint one side and the ends of each strip with Bostik A.A. Paint the seating with Bostik C., and wait until the compound is nearly dry before placing the strips in place.

Paint Bostik A.A. over the ends of all folds and corners in the fabric seals, and such places as the cut-outs for the stowage locker hasps. Plug the drain holes in stowage lockers with W.D.P.P.

Working underneath the track guards, paint with Bostik A.A. all bolts and cracks in stowage lockers.

Completely fill with A.C. the gap all round between the turret and the tank deck.

Using A.C., seal as follows :—

All seams and hatches and access covers on the engine compartment roof.

The turret revolver ports.

The driver's, gunner's and loader's periscopes.

Remove the cover over each periscope by withdrawing the split pins.

Withdraw the prism, clean housing, and smear edges with Lanolin. Replace the prism and clean its face.

Position the periscope as required, so that it will not be moved again before completion of the wading operation. Seal all seams, including around the outside of the armoured ring with A.C. Replace the cover.

The turret spotlight.

Smear compound over all seams and the lamp cable. Plug the end of the cable conduit with Lanolin.

Remove the union nuts securing the pipes leading from the gutters round the driver's and co-driver's doors to the side armour. Bend the pipes away from the apertures. Refit the union nuts and cover with A.C.

Also plug the open end of the track-guard support bracket adjacent to the co-driver's door. Seal edges and bolts on this bracket with compound.

SEALING CHECK

If the Officer supervising is satisfied that all sealing has been satisfactorily carried out, the vehicle can be immersed to a depth of 3 ft. in fresh water to test sealing.

Make a careful inspection for any sign of leakage. Mark the faulty places, and re-seal to the applicable instructions.

The vehicle is now ready to proceed to the point of embarkation, but must not be driven more than 75 miles.

REMEMBER—

Water will find the smallest chink and leave you stranded in the 'drink.'

STAGE 2

PREPARATION IMMEDIATELY PRIOR TO EMBARKATION

Check fuel, oil, and radiator water, and replenish as necessary. Take great care not to spill. Carefully re-seal all access covers, and escape hatch in floor, if fitted.

Erect air outlet duct, proceeding as follows :—

Smear seatings with A.C. Do not touch with Bostik.

Stand duct in position and insert T bolts in slots in lugs on base.

Assemble tie rod as Fig. 9, leaving all turnbuckles slack. Take the securing bar off the release gear, and fit the tie rod over the release gear pin. Replace the bar.

Tighten the T bolts down evenly until the jointing strip is just **slightly** compressed.

Then tighten up the tie rod to bring the duct inwards and so exert an even pressure all over the seating.

Remove release-gear operating-handle from loaders' hatch and erect air-intake funnel as follows :—

Fit clip bracket and strut bracket and secure with screws to pads provided on turret roof next to loader's hatch. Install air intake funnel by placing the funnel so as to enclose the hatch and secure in position with quick-release fasteners.

Replace release-gear operating-handle and cable.

Seal over the commander's cupola ring with grease G.S.

Lubricate all suspension and running gear in accordance with the lubrication chart.

Make a careful inspection of the vehicle for damage to sealing already carried out. Touch up any doubtful places with A.C.

Procure a used petrol tin and fill with waste engine-oil. Stow as convenient aboard the vehicle.

Vehicles have been immobilised through tracks rusting up during a long sea voyage.

The waste oil will be used to prevent this.

STAGE 3

ACTION AFTER EMBARKATION

If the sea voyage is likely to be of any length, smear over the tracks daily with the waste engine oil brought for this purpose.

Keep the vehicle closed down and sheeted over as long as possible.

When preparing to leave the craft :—

Completely close the driver's vizor and seal with A.C.

Inspect the rear sludge drain for possible oil seepage. If in doubt pack more A.C. around the drain.

Move the gear change lever (4th to 5th gear positions), or clutch pedal as applicable, twenty full strokes, to ensure all axle cross tubes are high pressure lubricated.

Close and seal with A.C., driver's and co-driver's hatches and driver's vizor. If catches are fitted to the doors, wedge these with a piece of wood so that they cannot engage.

When all crew are in place close down the vehicle and if possible seal the commander's hatch from outside using A.C.

Prepare armament for action. **This should be done at the last practicable moment.**

Remove oily rag from chamber.

Extract the lanyard or pull through, by pulling smartly from the breech end of each gun.

Dry clean the chamber, using a piece of rag wrapped around the hand for the 6-pr. and a chamber stick for the machine guns.

Driver's Instructions : When beginning to drive down the ramp, approach the point of balance slowly in 1st gear and square on. Once over the point of balance, do not steer, or accelerate until the vehicle is completely off the ramp and on an even keel. Then change into 2nd gear, keep the engine revs. up, and keep going at all costs, so as not to obstruct following vehicles.

REMEMBER it's a steep drop into the water, **SO HOLD TIGHT.**

STAGE 4

ACTION TO BE TAKEN IMMEDIATELY ON LANDING

As soon as the commander is certain not more than 3 ft. of water will be encountered again, prepare for action thus :—

Plug in wiring harness to blow off the sealing fabrics in the following order : (1) Insert two pin plugs in inspection lamp socket right side of driver. (2) Switch on festoon lamp **fully**. Immediately the Cordtex has exploded, remove the plugs from the sockets.

Jettison outlet duct. One member of the crew must reach out and operate the release handle.

The turret may now be traversed and armament used. **Do not fire an H.E. round** until the 6-pr. muzzle cover has been removed by an A.P. or smoke shell.

If any water is in the vehicle, open a sludge drain so as to allow it to escape.

While the vehicle is stationary, move the gear change lever from 4th to 5th gear positions 20 times or, alternatively, operate the clutch pedal to re-lubricate all axle cross tubes.

Remove fabric from rear outlet louvre.

Clean all vision devices.

STAGE 5

Clean off the remains of all fabric and A.C. sealing.

Discard remains of wiring harness.

Open fording flap and lock open.

Drain both final drives and refill with oil Hypoid 80.

Lubricate all road wheels with Grease G.S. until grease oozes from the back of each hub.

Lubricate both track tensioner inner and outer worm gears. (Centaur type).

Replace pipes from gutters over driver's and auxiliary gunner's doors, first removing A.C. sealing.

Fitter : Refit fuel tank vent pipes in original position. Remove plugs from unions on hull side plates, clean carefully, bend vent pipes back into position and couple to unions.

STAGE 6

REMOVAL AND REPLACEMENT OF SPECIAL FITTINGS AFTER LANDING

Remove release gear by unbolting from adaptor plate.

Replace rear towing hook.

Replace rear smoke generator dischargers.

Replace nose and tail track-guard extensions.

Notes